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Title of the Invention: Heating Two-Bath System Hair-Perming Liquid and Method for Hair-Perming Using the Same

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Abstract:

Problems To Be Solved:

To provide a heating two-bath system hair-perming liquid which can take care of all of hair-straightening perm, permanent wave setting and iron perm singly and is safe and does not cause the damages in the hairs.

Means for Solving the Problems:

Said heating two-bath system hair-perming liquid comprises an aqueous solution containing a hair-reducing agent as the main component and further an interstitial matrix and an intercellular lipid, wherein the interstitial matrix is preferably contained at a ratio of 0.1-15 wt. % and a ceramide, the main component of the intercellular lipid, is preferably contained at a ratio of 0.01-2 wt. %, and further one or more compounds selected from a group consisting of collagen protein, keratin protein and their hydrolyzates are preferably used as the interstitial matrix.

Scope of Claims for a Patent :

1. A heating two-bath system hair-perming liquid characterized by introducing into a solution comprising a hair-reducing agent as the main component an interstitial matrix, along with an intercellular lipid
2. A heating two-bath system hair-perming liquid according to Claim 1, wherein said interstitial matrix is contained at a ratio of 0.1-15 wt. %.
3. A heating two-bath system hair-perming liquid according to Claim 1 or 2, wherein the ceramide which is the main component of said intercellular lipid is contained at a ratio of 0.01-2 wt. %.
4. A heating two-bath system hair-perming liquid according to any of Claim 1, 2 or 3, wherein said interstitial matrix is one or more compounds selected from the group consisting of collagen protein, keratin protein and their hydrolyzates.
5. A method for hair-perm wherein the hair in a state of being kinky such as depressed wavy or curly is permed to straighten out by using the heating two-bath system hair-perming liquid according to any of Claims 1-4.
6. A method for hair-perm according to Claim 5 wherein a hair iron is used to fix the hair with the heat in the process for hair-straightening perm.
7. A method for hair-perm wherein a permanent wave is set into the hair with a wave set device in the process for permanent wave setting using any of the heating two-bath system hair-perming liquid according to any of Claims 1-4.
8. A method for hair-perm wherein iron perm is performed with a hair iron in the process for iron perm using any of the heating two-bath system hair-perming liquid according to any of Claims 1-4.
9. A method for hair-perm according to Claim 5, Claim 7 or Claim 8 wherein the hair is heated with far infrared ray equipment such as a far infrared ray hair heater or steamer-generating equipment such as a hair steamer and the like which are generally used in beauty parlors to dry or heat the hair, in the processes for hair-straightening perm, permanent wave setting or iron perm using any of the heating two-bath system hair-perming

liquid according to any of Claims 1-4.

Detailed Description of the Invention:

Technical Field to Which the Invention Pertains:

The present invention relates to a heating two-bath system hair-perming liquid and a method for hair-perm using the same. More particularly, it relates to a technique capable of perming the kinky hair to straighten out (to mend the curly hair) or setting a permanent wave into the ordinary hair or perming said ordinary hair with a hair iron by using the perming liquid singly according to the heating two-bath formulation. This heating two-bath system hair-perming liquid is a chemical usable in all of hair-straightening perm, permanent wave setting and iron perm..

Background of the Invention:

It has been known that the human hairs are divided into directly straight hairs and kinky hairs such as depressed wavy hair, curly hair and the like. As the true human psychology, the people having the straight hair by nature are strongly desirous of the wavy hair, while those born with the kinky hair necessarily want to have the straight hair. Conventionally, in response to these desires, the wavy hairs have been provided by means of the remedy using permanent wave agents, while the people having the kinky hairs have received kinky hair mending agents to have their hairs straightened out.

Meanwhile, the difference between the straight hair and the depressed wavy hair or curly hair is explained not only by the difference of the shape of hair. But it has also been known that they are different in a big way because of the structure of substance in a piece of hair. In this connection, the depressed wavy hair or curly hair should be thought of as disposed to grow to be kinky from the root of the hair. Therefore, it is the most difficult job to straighten out the depressed wavy hairs or curly hairs, accompanied by the risk of hair damages, while the straight hairs can be permanently waved with ease.

Conventionally, the hair-straightening perming liquids for use in perming the hair to straighten out (the kinky hair mending agents) have been developed and merchandised apart from the permanent wave agents to set a permanent wave into the hair (permanent wave setting). Thus, for example, there has been a problem that, If the permanent wave is set into the hair by using a kinky hair mending agent, the hair cannot be sufficiently waved, with the possibility of damaging the hair. Especially, the strongly curly hairs have conventionally been taken care of in a way that the strong liquid chemicals (kinky hair mending agents) are used as the first liquid to soften the hairs by force and straighten them out and thereafter the second liquid (the second chemical) takes its turn to fix the hairs with oxidization.. The hairs may have excessive softening, with the result that the cuticles (the cortex of the hair shaft) are peeled off from the hairs and the moisture content and interstitial matrix are eluted out from within the cortex of the hair shaft. Thus, the hairs are thinner, broken, split and tattered and thus can hardly be permed, while the insufficiently softened parts of the hairs become kinky as they were.

In the past, hair-straightening perm was carried out with a technique that the hairs were straightened out by putting them on a panel (a plate of acrylic resin). The technique was found to have a problem that a load was weighed at the root of hairs because of the weight of panel and thus the hairs were broken. Presently, it has been replaced by a method for providing the straight hairs by means of combthrough (combing) and a method for stretching and straightening the hairs with a curling iron. Since the hairs are straightened out by combing in the former method, it is excellent in safety, but accompanied by a problem that the so remedied hairs are easy to return to the curly hairs as they were. The latter method for stretching and straightening the hairs with the curling iron is found to have a problem that the cuticles are peeled off because of the heat, the chemical liquids are not uniformly penetrated and thus some hairs are softened sufficiently and some are not. Furthermore, the peeling off of the cuticles gives rise to another problem that the hairs are reluctant to the wave setting perm, curling iron perm or the like after they are straightened out.

Problem to be Solved by the Invention:

The present invention has been attained under the above-mentioned circumstances as the background. As the problem to be solved, the object of the present invention is to provide a heating two-bath system hair-perming liquid which can take care of all of hair-straightening perm, permanent wave setting and iron perm singly and is safe and does not cause the damages in the hair. Another object is to provide a method for taking care of the hair efficiently with hair-straightening perm, permanent wave setting and iron perm by using said liquid. Furthermore, the present invention is also characterized in that even the strongly curly hairs can be directly straightened out with a weak chemical liquid.

Means for Solving the Problem:

Thus, the present invention has found that its object can be attained by a heating two-bath system hair-perming liquid characterized by comprising a solution containing a hair-reducing agent as the main component and introducing into said solution an interstitial matrix and an intercellular lipid (ceramide).

Namely, the heating two-bath system hair-perming liquid according to the present invention is used as the first liquid (first chemical) in the operation of heating two-bath system hair-perming. Said liquid is applied to the hair and heated. As a result, the intercellular lipid (ceramide), interstitial matrix and moisture content, all contained in the hair-perming liquid, pass through the space of cuticles and are efficiently incorporated into within the hair by the force of the hair-reducing agent which is the main component of the hair-perming liquid. Then, with the action of the intercellular lipid (ceramide) in the hair-perming liquid (to prevent the interstitial matrix and moisture content from running out from within the hair), the hair is fully packed with the interstitial matrix and moisture content. Thereafter, the hair is applied with the second liquid (second chemical) containing an ordinary oxidizing component and oxidized to regain the elasticity of the hair, so that the hair is strong, tough and lustrous. At the same time, the hair can be straightened out, have a permanent wave or be permed with a curling iron.

Meanwhile, as the preferred mode, the heating two-bath system hair-perming liquid of the present invention should contain said interstitial matrix preferably at a ratio of 0.1-15 wt.% and the intercellular lipid (ceramide) preferably at a ratio of 0.1-2 wt. %. Said interstitial matrix is one or more compounds selected from the group consisting of collagen protein, keratin protein and their hydrolyzates. The so formulated hair-perming liquid can find more advantageous applications.

The present invention also relates to a method for perm using said heating two-bath system hair-perming liquid, and one of its objects is to provide a method for perming the hair in the under-mentioned way. That is, the hair in a state of being the kinky hair such as depressed wavy hair, curly hair and the like is applied with said hair-perming liquid of the present invention as the first liquid to soften the hair, and then softening of the hair is expedited with heating at 60°C or lower. At the step of softening the hair, the ceramide, interstitial matrix and moisture content from said hair-perming liquid are incorporated into within the hair through the space of cuticles by dint of the force of the hair-reducing agent. Incidentally, the hair-reducing agent is the main component of said hair-perming liquid. With the action of ceramide in said hair-perming liquid (to advance the moisture retaining function and to improve the barrier function), the inside of the hairs is fully packed with the incorporated interstitial matrix and moisture content. As a result, the cross section of the hair is made into the shape of complete round and the hair is straightened out. Thereafter, the hair is fixed with heat, oxidized with the application of the second liquid containing an oxidizing agent and regains their elasticity, to complete the hair-straightening perm.

In other words, the method for perm of the present Invention works in the following way. The hair-perming liquid is applied to the hair. The ceramide, interstitial matrix and moisture content are incorporated from the liquid through the space of cuticles into within the kinky hair such as depressed wavy hair, curly hair and the like by dint of the force of hair-reducing agent. Incidentally, the hair reducing agent is the main component of said hair-perming liquid. Thus, the kinky hair is inflated. The curly hair having the cross section in the shape of a triangle like, for example, a rice ball and the depressed wavy hair having the

cross section in the shape of an ellipse are fully packed with the incorporated interstitial matrix and moisture content with the actions of ceramide. (The ceramide in the hair-perming liquid advances the moisture retaining function and improves the barrier function). Thus, the hair is changed into a straight hair in the shape of complete round. The hair in this state can be oxidized and fixed according to the conventional techniques. The ceramide in the hair-perming liquid keeps the moisture content and interstitial matrix staying within the cortex (cortex of the hair shaft) and cuticles (epitheliums) of the hair. (The ceramide has the effect to prevent the interstitial matrix and moisture content from running out from within the hair). The moisture retaining function is advanced and the barrier function is improved with the result that the desired straight hair is provided safely and efficiently without inflicting damages on the hair and the so straightened hair can last long.

Furthermore, said heating and fixing are carried out preferably by using such a curling iron as flat iron and the like in hair-perming according to the present invention.

Still another object of the present invention is to provide the following hair-perming method as a preferable mode using said heating two-bath system hair-perming liquid of the present invention. The method is characterized by setting a permanent wave into the hair. The hair is applied with said hair-perming liquid of the present invention as the first liquid to soften the hair at first. Then, the hair undergoes the winding (winding the hair on a wave set device) for the purpose of forming a designed wave and is heated at 60°C or lower to accelerate softening of the hair. Upon softening of the hair, the ceramide, interstitial matrix and moisture content are incorporated from said hair-perming liquid through the space of cuticles into within the hair. With the actions of ceramide (to accelerate the moisture retaining function and to improve the barrier function) in said hair-perming liquid, the hair is fully packed with interstitial matrix and moisture content. The cross section of the hair is changed into the shape of complete round and the hair is straightened out. Thereafter, the so straightened hair is made wavy as designed by using a wave set device and then oxidized with the application of the second liquid containing an oxidizing component. The oxidation makes the hair regain its elasticity in the state of remaining winding as described above. In this way, the permanent wave is completed.

At the step of setting a permanent wave into the hair according to the present invention, the winding is carried out to make the hair wavy. Such winding should be implemented with the use of a wave set device. The examples thereof include the devices such as perming rod and the like and the other devices such as hair pin, wire, stick, sponge and the like.

Still more object of the present invention is to provide the following method for perm as a preferable mode using said heating two-bath system hair-perming liquid. The method is characterized in that the hair is permed with a curling iron by applying said hair-perming liquid of the present invention to the hair as the first liquid and softening the hair at first. Then, softening of the hair is expedited by heating the hair at 60°C or lower. Upon softening of the hair, the ceramide, interstitial matrix and moisture content are incorporated from said hair-perming liquid, through the space of cuticles into within the hair by dint of the force of hair-reducing agent. Incidentally, the hair reducing agent is the main component of said hair-perming liquid. (The ceramide advances the moisture retaining function and improves the barrier function in said hair-perming liquid) Because of these actions of the ceramide, the hair is fully packed with the interstitial matrix and moisture content with the result that the cross section of the hair is changed into the shape of complete round and the hair is straightened out. Then, the so straightened hair is made to have a wave as designed with a hair iron, applied with the second liquid containing an oxidizing component and oxidized to regain the elasticity of the hair. In this way, the iron perm is completed.

In the process for iron perm according to the present invention, the wave is formed with the use of a hair iron. Example thereof includes a curling iron for heating the hair and the like.

In the processes for setting the permanent wave or iron perm, the methods of the present invention take effect in the following way. Said hair perming liquid used as the first

liquid contains a hair reducing agent as the main component. The force of this component is used to incorporate the ceramide, interstitial matrix and moisture content from the hair-perming liquid through the space of cuticles into within the hairs to a large extent. (The ceramide in the hair-perming liquid advances the moisture retaining function and improves the barrier function.) Because of these actions of the ceramide, the hair is fully packed with the incorporated interstitial matrix and moisture content. The hair is softened into a state of having a cross section in the shape of complete round like that of the straight hair. The wave is set into

the hair by means of winding or with a hair iron and then the hair in that state are fixed with oxidization. (The ceramide contained in the hair-perming liquid prevents the interstitial matrix and moisture content from running away from within the hairs.) With these actions of the ceramide, the moisture content and interstitial matrix can stay within the cuticles, increasing the moisture retaining function, improving the barrier function and providing the long lasting permanent wave or iron perm without causing the damage in the hair.

Furthermore, according to the methods of the present invention, the hair is applied with the prescribed hair-perming liquid and heated. It is preferable that the hair should be heated with the use of a far infrared hair heater or hair steamer, since these devices can provide more effective softening of the hair.

Embodiment of the Invention:

Meanwhile, the heating two-bath system hair-perming technique of the present invention presupposes an improvement of methods generally accepted for hair-perming. A conventional method for hair-perming applies to the hair the first liquid comprising a mercapto compound as a reducing agent in the place of the main component and introducing thereto such alkaline agents as ammonia, monoethanolamine and the like. Keratin protein of the hairs contains cystine, the disulfide bond of said cystine is broken with its reduction, and the hair is made into a desired shape with the application of the physical force. The so shaped hair is applied with the second liquid containing an oxidizing component such as bromate, hydrogen peroxide and the like to regenerate the disulfide bond and to regain the elasticity of the hair with its oxidization. In this way, the shape given to the hair is fixed to attain hair-perming as designed according to the conventional methods. Contrastively in the present invention, an interstitial matrix along with a ceramide are introduced into such hair-perming liquid (hair-perming chemical) containing a hair-reducing agent as the main component to be used as the first liquid. The so obtained hair-perming liquid is applied to the hairs, with the result that the ceramide, interstitial matrix and moisture content pass through the space of cuticles and are efficiently incorporated into within the hairs by dint of the force of the hair-reducing agent. Then, the hairs are swollen, and with the actions of ceramide (advancing the moisture retaining function and improving the barrier function), the incorporated interstitial matrix and moisture content are fully packed into within the hairs. The cross section of the hairs is changed from the deformed or heteromorphous shape to that of the complete round cross section, making it possible to achieve the good hair-perming technique.

Thus, a ceramide, a substance playing an important role in the present invention, is counted among intercellular lipids.

(covering the space among the cells). The intercellular lipid comprises sphingolipid at a ratio of about 55%, free fatty acid at a ratio of about 20%, cholesterol at a ratio of about 15% and cholesterol ester at a ratio of about 10%. As the sphingolipid family, the composition is explained by the ceramide at a ratio of about 50% and cerebroside at a ratio of about 5%. In order to increase the moisture retaining function and improve the barrier function, it is most important to supplement the ceramide accounting for a greater part of the composition of intercellular lipid. The intercellular lipid (ceramide) plays the role of an adhesive agent to get cells together firmly. Intercellularly, the

ceramide also builds a stratified lamellar structure of free fatty acid, cholesterol, cholesteryl ester and the like, storing the moisture in the space thereof, and this stratified structure contributes much to the barrier function. The ceramide is an essential component to create the barrier, and a great deal of moisture content is held within the lamellar structure created by the ceramide, improving the moisture retaining function. One ceramide interacts with another, replenishing intercellular lipid powerfully, and thus the barrier function is improved to prevent infiltration of the stimulants from the outside or prevent the moisture content from running away outward. The ceramide, interstitial matrix and moisture content are incorporated from the heating two-bath system hair-perming liquid through the cuticle space (epithelium of the hair) into within the hairs by dint of the force of hair-reducing agent. Incidentally, the hair reducing agent is the main component of said hair-perming liquid (first liquid). Within the hairs, the ceramide, interstitial matrix and moisture content contained in the hair-perming liquid interact with the components within the hair in a way that the interstitial matrix gets hold of the moisture content and retains it. The ceramide plays the role of adhesive agent to maintain said moisture content firmly, and a stratified lamellar structure (inserting the moisture content between the layers like the sandwiches so that it is not turned loose) is formed of ceramide, holding a great deal of moisture content therein. The ceramide plays the role of protecting the interstitial matrix and moisture content against the outward flow from within the hair, improving the moisture retaining function. One ceramide interacts with another, replenishing the intercellular lipid powerfully, improving the barrier function and thus decreasing the susceptibility to stimuli (due to the heat of dryers, ultraviolet ray, chlorine in swimming pools and the like). Thus, the moisture content will hardly be evaporated outside. With these actions of ceramide (advancing the moisture retaining function and improving the barrier function) in the hair-perming liquid, the inside of the hairs is filled up sufficiently with the incorporated moisture content and interstitial matrix. As a result, the cross section of the hairs is shaped more like complete round, making it possible that the damaged hairs are efficiently repaired and peeling off of cuticles is also efficiently prevented. Since the unbalanced dispersion of protein is modified in the hairs themselves, resulting in obtaining of the completely round hair, even the kinky hairs are eligible for hair-straightening perm, permanent wave setting or iron perm in good looking conditions.

As the ceramide of the present invention, the natural ceramide (bovine brain extract or plant extract), synthetic ceramide (the combination of products from fermentation and organic synthesis) and synthetic imitation ceramide (synthetic products having the function and structure similar to those of ceramide) can suitably be used in general. The content of said ceramide in the hair-perming liquids should suitably be decided, depending upon the kind of hairs, conditions of the hair-perming operations and the like, but the ceramide is generally contained at a ratio of 0.01-2 wt.%, preferably 0.2-0.6 wt.%. If the content of ceramide is less than the range as described above, the compound cannot exhibit the actions as described above to a full extent. If the content of ceramide is greater than the range as described above, it will be economically disadvantageous, because the compound fails to be effective in proportion to the amount.

As the interstitial matrix to be incorporated into within the hair with the aid of said ceramide, the known compounds can be used. In the present invention, for example, collagen protein, keratin protein or their hydrolyzates such as peptide or amino acid are used singly or in combination. These interstitial matrices are generally added to and contained in the hair-perming liquids at a ratio of 0.1-15 wt. %, preferably 1-10 wt. %. If the content of these interstitial matrices is less than described above, the compounds will hardly swell the hairs to have the shape of complete round with the aid of the ceramide (advancing the moisture retaining function and improving the barrier function). If the content of the interstitial matrices is greater than described above, the compounds cannot be active or effective in proportion to the amount.

The heating two-bath system hair-perming liquids of the present invention comprise a hair-reducing agent as the main component. As this hair-reducing agent, those generally used in the first liquids for hair-perming, for example, thioglycolic acid, thioglycolate, cysteine, cysteine derivatives, sulfite, hydrogensulfite and the like are used. The content of these hair-reducing agents should be different depending upon the kind of reducing agents but it is generally at a ratio of about 3-30 wt. %. The heating two-bath system hair-perming liquids of the present invention comprise said hair-reducing agent as the main component and said ceramide and interstitial matrix as the essential component. These hair-perming liquids are provided in the form of a solution dissolving these components in water (generally having the water content at a ratio of about 50-90 wt. %). In addition to these essential components, the solutions may as well be suitably blended to contain various other components which have conventionally been used in the hair-perming liquids as far as they can go along with the effects of the present invention. Their examples include the alkaline agents such as ammonium, monoethanolamine, ammonium carbonate, sodium carbonate, sodium bicarbonate, sodium hydroxide and the like; the reaction adjustors such as dithiodiglycolic acid, ditdhiodiglycolate and the like; other oils and fats; higher alcohol; silicones; the surfactants (cationic, anionic, nonionic, amphoteric); perfume; coloring agents; hair protectants; chelating agents; poypeptides; ultraviolet ray absorbents; preservatives; humectants; thickening agents; cationic, anionic and nonionic polymer; and the like.

Now, the present invention brings the heating two-bath system hair-perming operation into practice using the heating two-bath system hair-perming liquid. The depressed wavy hairs or curly hairs are subjected to hair-straightening perm or the prescribed hairs are permed to have a permanent wave or undergo the operation of iron perm. Upon practicing, the hairs are diagnosed at first as have done conventionally, followed by a shampooing and a treatment. In the case of hair-straightening perm, the shampoo is given after the hairs are oxidized by applying the second liquid containing an oxidizing component in the post diagnosis period as described above. For the sake of a permanent wave or iron perm, the hairs receive the shampoo and the treatment after their diagnosis, while the hairs are shampooed after said oxidization in the hair-straightening perm because it is necessary to know how kinky hairs they are.

In the hair-straightening-perm, the hair is diagnosed at first and then receives a treatment as the preparatory procedure. Thereafter, the hair-perming liquid of the present invention is carefully applied as the first liquid time and again to the surface and back of the hairs to a total of 1-8 times so that the first liquid penetrates throughout the hairs. The ceramide, interstitial matrix and moisture content are made easy to be incorporated from the hair-perming liquid through the space of cuticles into within the hair by dint of the hair-reducing agent, the main component of the hair-perming liquid, in order to soften the hairs. In hair-straightening perm, the hair-perming liquid is applied to the hair as said first liquid to soften them, and then softening of the hair is expedited with heating at 60°C or lower. Upon softening of the hair, the ceramide, interstitial matrix and moisture content are incorporated from said hair-perming liquid through the space of cuticles into within the hair by dint of the force of the hair-reducing agent, expediting softening of the hairs further. As described above, the hair-reducing agent is the main component of said hair-perming liquid.

In this way, the disulfide bond of cystine is broken in keratin protein of the hair. (Meanwhile, the ceramide is effective in advancing the moisture retaining function and improving the barrier function in the hairs.) With these actions of the ceramide, the hair is simultaneously swollen and the inside of the hair is full of the incorporated interstitial matrix and moisture content. The deformed or heteromorphous cross section are mended into a shape of complete round in the damaged hairs or the kinky hairs such as depressed wavy hair, curly hair and the like. The hairs are straightened out with their cross section in the shape of complete round and then fixed with heating in that state.

In the process of hair-straightening perm, the hairs are heated at a temperature of about 40°C-60°C for about 1-50 minutes after the hair-perming liquid is applied. The examples of usable heater or heating equipment include a far infrared ray hair heater, hair steamer, hair dryer and the like, but it is more preferable to use a far infrared ray hair heater or a hair steamer in that those devices can heat the hairs evenly and uniformly and are excellent in the capability to penetrate the liquid chemicals into the hairs. Meanwhile, an iron for use in beauty parlor can advantageously be used in fixing with the heat. For example, after the curly hairs are straightened out, they can be steadily fixed by pressing them carefully with a flat iron at a set temperature of about 140°C-180°C starting from their root. In this way, it is feasible to fix the straightened hairs derived from the curly hairs.

In the process for setting a permanent wave into the hair, the hair-perming liquid of the present invention is applied to the hair as the first liquid to soften the hair, as described above. Thereafter, the hair is wound around a rod or the like, to give winding for the purpose of forming the designed wave as done conventionally in the past. Next is heating at 60°C or lower to expedite softening of the hair. Upon softening of the hair, the ceramide, interstitial matrix and moisture content are arranged to be incorporated from the hair-perming liquid through the space of cuticles into within the hair by dint of the force of the hair-reducing agent. Incidentally, the hair reducing agent is the main component of the hair-perming liquid. (Meanwhile, the ceramide is effective in advancing the moisture retaining function and improving the barrier function in the hair-perming liquid.) With these actions of the ceramide, the incorporated interstitial matrix and moisture content are fully packed into the inside of the hair. As a result, the hair has the cross section in the shape of complete round and simultaneously the disulfide bond of cystine is correctly broken in keratin protein of the hair, making it possible to set a beautiful wave into the hair.

Furthermore, in the process for iron perm, the operations are carried out until the step of heating in the same way as in the case of hair-straightening perm as described above. Thereafter, the hairs are perm to have the designed wave with a hair iron. Specifically, the hairs are perm to set the wave slice by slice respectively at a width of about 1 cm by using an iron such as ceramic far infrared ray iron and the like. In this way, the entire hairs are curled to have a wave as designed. At this step, ironing is conducted at a set temperature of about 100°C-180°C. This wave is provided to the hair in a state of complete round by the curling iron, resulting in a beautifully formed wave.

For the purpose of setting the permanent wave into the hair or iron perm, heating is performed in the same way as that of hair-straightening perm. Generally, the hairs are heated at a temperature of 40°C-60°C for about 1 minute-30 minutes. The examples of usable heater and heating equipment include a far infrared ray hair heater, a hair steamer, a hair dryer and the like, but it is more preferable to use the far infrared ray hair heater or hair steamer since they can heat the hairs evenly and uniformly and are excellent in the capacity of penetrating the liquid chemicals into hairs.

Meanwhile, the adherent hair-perming liquids are removed by washing from the surface of the hairs after use of the hair-perming liquid as the first liquid is ended in all of the hair-straightening perm, setting the permanent wave, or iron perm. The same removal should take place likewise after the completion of incorporating the ceramide, interstitial matrix and moisture content into within the hairs. In these events, the hairs are treated with a plain rinse (washing away with warm water). and this is called the midway rinse. If an acidic

rinsing agent is used in this midway rinse, the succeeding oxidization can more effectively be performed. In hair-straightening perm and iron perm, a treatment agent is used to decrease the scrape of the hairs after the plain rinse (washing away with warm water). Such a treatment agent will serve as a protectant of the hairs against the operation of curling iron or hair iron at the subsequent perming steps (hair-straightening perm and iron perm).

The hairs have been treated with the hair-perming liquid (first liquid) of the present invention as described above. Now, the hairs are applied with the second liquid containing an oxidizing agent in the same way as done conventionally, in order to regenerate the disulfide bond which has been once broken within the hairs and to make the hairs regain the elasticity. By regenerating the disulfide bond of cystine with the oxidization within the hairs, the hairs in a state of being straightened out as a result of hair-straightening perm can be permanently fixed as they are. And, the hairs having a permanent wave or a wave resulting from iron perm can likewise be fixed in that state permanently.

Meanwhile, the second liquid to be used herein comprises same chemicals as have been the conventionally used as the second liquid (second chemical) in hair-straightening perm, setting the permanent wave into the hair or iron perm. In general, the second liquid occurs as a solution having a moisture content of about 50-90 wt. %. The second liquid suitably contains antacids such as bromate, hydrogen peroxide and the like; pH adjustors such as citric acid, sodium citrate, phosphoric acid and the like; other resins; higher alcohol, silicones; cationic surfactant, anionic surfactant, nonionic surfactant and amphoteric surfactant; perfume, coloring agents; hair protectants; polypeptides; ultraviolet ray absorbents; preservatives, humectants; cationic polymer, anionic polymer, nonionic polymer and the like.

The adherent second liquid are removed from the surface of the hairs oxidized with said second liquid by washing it with water in the same way as done conventionally. In the case of iron perm, if winding of the hairs has been conducted for the purpose of setting the permanent wave, the hairs should be washed immediately after the winding jigs such as rod and the like are removed in the post oxidization period. Thereafter the hairs undergo the finishing operation such as treatment and the like. In the case of hair-straightening perm, the hairs are washed with a shampoo after the oxidization with the second liquid is over. Thereafter the hairs undergo the finishing operation such as treatment and the like, completing the straightened hair, waved hair or ironed hair as designed.

Examples:

The present invention will further be explained in specific detail below with reference to examples. It is needless to say that these examples should not be construed to limit the scope of the present invention in any way. It should also be understood that the present invention can undergo various changes, amendments and improvements outside the under-mentioned examples and above-mentioned descriptions on the basis of knowledge of persons skilled in the art as far as they do not deviate from the scope and spirit of the present invention. In the under-mentioned examples and the present specification, the percentage is by weight unless otherwise indicated.

At first, it should be mentioned that, in the under-mentioned examples, the chemically synthesized ceramide was used as ceramide which is the essential component of the present invention. A mixture of hydrolytic collagen (having the molecular weight of 2000 or lower) and hydrolytic keratin (having the molecular weight of 1000 or lower) at a ratio of 2:1 was used as the interstitial matrix. Then, 4 kinds of hair-perming liquids I, II, III and IV were respectively prepared by blending the components listed in Table 1 below at the prescribed ratio. The hair-perming liquids I and II were the liquids abiding by the present invention, and the former liquid was for healthy hairs, colored hairs and damaged hairs and designated as the invention product A, while the latter was for highly damaged hairs, bleached hairs and porous hairs and designated as the invention product B. On the other hand, the hair-perming liquid III was the liquid for comparative purpose without containing the ceramide and designated as the comparison product A. The hair-perming liquid IV

was the liquid containing the ceramide but not the interstitial matrix. The liquid was designated as the comparison product B. Furthermore it was also arranged that a hair-perming liquid containing the components of the present invention at the same strength as products on market was prepared for the purpose of comparison. This product was designated as comparison product C.

Table 1:

Blended Components	Perming Liquids				
	Invention Product A	Invention Product B	Comparison Product A	Comparison Product B	Comparison Product C
L-Cystine	1. 35	3. 2%	1. 3%	1. 3%	-
Ammonium thioglycolate liquid (50%)	4. 5%	0. 3%	4. 5%	4. 5%	5. 0%
Monoethanolamine	0. 27%	0. 6%	0. 27%	0. 27%	1. 2%
Ceramide	0. 25%	0. 42%	-	0. 25%	-
Hydrolytic collagen, Hydrolytic keratin	5. 0%	8. 0%	5. 0%	-	-
L-arginine	0. 38%	0. 8%	0. 38%	-	-
Polyoxyethylene cetyl ether	2. 5%	2. 5%	2. 5%	2. 5%	2. 5%
Liquid of disodium EDTA or ethylenediamine pentasodium pentacetate	0. 5%	0. 5%	0. 5%	0. 5%	0. 5%
Perfume	Optimum amount	Optimum amount	Optimum amount	Optimum amount	Optimum amount
Thickening agent	Optimum amount	Optimum amount	Optimum amount	Optimum amount	Optimum amount
Moisture	Optimum amount	Optimum amount	Optimum amount	Optimum amount	Optimum amount

Examples 1A-1B and Comparative Examples 1A-1C (Hair-straightening-Perm)

Example 1A, Example 1B, Comparative Example 1A, Comparative Example 1B and Comparative Example 1C were performed respectively for hair-straightening perm with the use of the Invention Product A; the Invention Product B, the Comparison Product A, the Comparison Product B and the Comparison Product C in the named order.

The healthy hairs and highly damaged, strongly kinky (curly) natural hairs were subjected to hair-straightening perm by using these 5 kinds of hair-perming liquids.

Specifically, the tested hairs were diagnosed at first in the same way as done conventionally. Then, as the pre-treatment, the damaged parts of hairs were placed under a treatment using a commercial treatment agent conventionally used in the procedures prior to the permanent wave setting. The so treated hairs were applied with said hair-perming liquids, i.e. the Invention Product A, Invention Product B, Comparison Product A, Comparison Product B and Comparison Product C, as the first liquid to soften the hairs. Softening of the hairs was expedited by heating the hairs with a far infrared ray hair heater or hair steamer at a temperature of about 50°C for 15 minutes-50 minutes. When the hairs were found to be sufficiently softened, they were combed with a rough comb to straighten them directly and change them into a state of straight hairs, and the straightened hairs were further heated with a far infrared ray heater at a temperature of about 45°C for 3 minutes-20 minutes.

The so heated hairs were treated with an acidic rinse (the use of the acidic rinsing agent helps the oxidizing operation to do effectively at the next step) to remove the adherent perming liquid from the surface of the hairs. Thereafter, a midway wash with water (washing away with warm water) was given, and the hairs were placed under a treatment using a commercial treatment agent conventionally used after shampoo. The hairs were dried with a dryer and then fixed with the heat by pressing them carefully from their root on with a flat iron at the set temperature of about 160°C-180°C. This pressing operation was conducted slice by slice respectively in a width of about 5 mm and each panel was pressed 3-5 times, while the strongly peculiar parts of the hairs were forcefully pressed.

In order that said press-fixed hairs may be permanently fixed with oxidization to regenerate the disulfide bond, the hairs were applied with the conventional second liquid containing 7 wt. % of bromate as the oxidizing component as done conventionally. The second liquid was applied 2 times and allowed to stand for 5 minutes after each application and therefore for a total of 10 minutes. Meanwhile, cetanol, cetyltrimethyl ammonium chloride, propylene glycol, sorbic acid, paraben, salt of edetic acid and the like were blended into the second liquid respectively in an optimum amount. Due to the application of this second liquid, the disulfide bond of cystine was regenerated, enabling the hairs to regain their elasticity. Thereafter, the hairs had a shampoo wherein a commercial shampoo agent was used and washed with water, removing the adherent second liquid from the surface of the hairs. Furthermore, the hairs received a treatment using a commercial treatment agent conventionally used after shampoo, completing designed hair-straightening-perm.

As a result of said hair-straightening perm, the strongly kinky hairs were found to have changed to be in a beautifully straightened state in the tests wherein the Invention Product A or Invention Product B were used as the first liquid. By way of parenthesis, the Invention Product A and Invention Product B were the heating two-bath system hair-perming liquid of the present invention. It was further found that the so obtained smooth and lustrous straightened hairs could last semi-permanently. In the tests wherein the Comparison Product A was used, the hairs were found to make a state of being straightened out. But the Comparison Product A had a problem that the straightened hairs could not last long with the return of kinky hairs after about 30 days and was found to be also inferior to the Invention Products A and B in moisture retention. This was because the hair perming liquid designated as the Comparison Product A does not contain the ceramide, incapable of getting the moisture content and interstitial matrix incorporated through cuticles into the depth of the cortex of hair shaft. The moisture content and interstitial matrix are permitted to run away from the cuticles. In the tests wherein hair-straightening perm was conducted by

using the Comparison Product B, it was found that the hairs were straightened after perm but that the straightened hairs was low in moisture retention, poor in elasticity, strength, luster and the like and inferior to the counterparts designated as the Invention Products A and B in maintenance of straightness. This was because the hair perming liquid designated as the Comparison Product B contains the ceramide but not the interstitial matrix and is inferior to those of the Invention Products A and B in the function to retain the moisture content. In the tests wherein hair-straightening perm was conducted by using the Comparison Product C in the same way as above, the Comparison Product C was found to have a problem that the cuticles were peeled off because it was a strong chemical liquid, damaging the surface of the hairs. The hairs were found to snap or split or grow otherwise, with the result that they could not be sufficiently softened with the return of kinky hairs within about 7 days and were poor in maintenance of straightness. Furthermore, the damaged parts of the hairs were softened too much, giving rise to snapping of hair, unkempt hairs occurred with poor moisture retention and the permanent wave failed to be set into the hairs because the interstitial matrix and ceramide were not contained in the hair perming liquid.

[Confirming the Hair in the Shape of Complete Round] :

Herein, the effects of the present invention were established in the following way. The microscopic pictures were taken to compare the shapes of cross section in the hair sampled from the persons with the straight hairs (A, B) and the pre-perming and post-perming shapes of cross section in the hair sampled from the persons with the kinky hairs (C, D, E). Fig. 1, (a) and (b) illustrate the sketches of the microscopic pictures showing the cross section of the hair from the persons with the straight hairs (A, B). Fig. 2, (a), (b) and (c) illustrate the sketches of the microscopic pictures showing the pre-perming and post-perming cross section of the hair from the persons with the kinky hairs and the like (C, D and E). Then, the cross section of the hair from the persons with the straight hairs was compared with the post-perming cross section of the hair from the persons with the kinky hairs and the like as shown in Fig. 1 and F 2. As a result, it was confirmed as presupposed initially that the hair from the persons with the kinky hairs and the like had the cross section in the shape of complete round and that said cross section looked like that of the hair from the persons with the straight hairs in the post-perming period.

Briefly, as evident from the sketches of Fig. 1 (a) and (b) showing the cross section of the hair, it was confirmed that the hair had the cross section in the shape of complete round in the persons with the straight hairs.

In contrast, the sketches of Fig. 2 (a), (b) and (c) showing the pre-perming and post-perming cross section of the hair were compared. As evident therefrom, the cross section of the depressed wavy hairs or curly hairs was changed into the shape of complete round like that of the persons with the straight hairs on account of the hair perming remedy of the present invention.

For the sake of Examples 1A-1B and Comparative Examples 1A-1C, the results of evaluation are shown in Table 2 below.

Table 2:

		Performance and Effects						
		Hair damage	Elasticity, luster and strength	Water retention effect	Mending of peculiarity	Intrinsic feel-ing of liquid	Perm. wave after hair strai-ghten-ing perm.	Life of hair strai-ghten-ing perm.
(1)	Example 1A	No	◎	◎	◎	◎	◎	—
	Example 1B	No	◎	◎	◎	◎	◎	—
	Comparative Example 1A	No	○	○	△	○	△	—
	Comparative Example 1B	No	○	○	△	○	△	—
	Comparative Example 1C	Yes	×	×	×	×	×	—
(2)	Example 1A	No	◎	◎	—	◎	—	◎
	Example 1B	No	◎	◎	—	◎	—	◎
	Comparative Example 1A	Yes	△	△	—	△	—	×
	Comparative Example 1B	Yes	△	△	—	△	—	△
	Comparative Example 1C	Yes	×	×	—	×	—	×

Read (1) and (2) as follows:

(1) Evaluation of the finish in the hair-straightening perm.

(2) Post-treatment evaluation of hair-straightening perm

◎: Very good ○: Fairly good △: Not so good ×: Bad

Example 2A and Comparative Example 2A (Hair- Straightening Perm)

In the process for hair-straightening perm using the Invention Product A representing the heating two-bath system hair-perming liquid of the present invention, the hairs are fixed with the heat by using a curling iron (called a flat iron herein).. Example 2A accounts for a test wherein the hairs were treated according to this method. In another test the hairs were treated with a combing through technique on top of the hair-straightening perm using the Invention Product A representing the heating two-bath system hair-perming liquid of the present invention. The test was designated as Comparative Example 2A.

[0049] Table 3 below shows the results of evaluating Example 2A and Comparative Example 2A.

Table 3:

Performance and Effects	Example 2A	Comparative Example 2A
Effects of hair- straightening perm	◎	×
Damage in hairs	No	No
Elasticity, luster & strength	◎	△
Service life of hair straightening perm	◎	×

◎: Very good ○: Fairly good △: Not so good ×: Bad

As described in Table 3, Comparative Example 2A was found to have a problem that the old kinky hairs were easy to return, because fixing of the kinky hairs was weak. However, hair- straightening perm of Comparative Example 2A was excellent in safety without burdening the hairs with a heavy load. In contrast, it was found that Example 2A was far

more excellent than Comparative Example 2A particularly in terms of the load and safety in hairs and in fixing of the kinky hairs wherein the straightness resulting from fixing of the kinky hairs could last semi-permanently.

Examples 3A-3B and Comparative Examples 3A-3C (Permanent Wave Setting)

Example 3A and Example 3B account for the test of setting permanent wave into the hair using the Invention Product A and Invention Product B respectively in the named order. Comparative Example 3A and Example 3B account for another test of setting the permanent wave into the hair using the Comparison Product A and Comparison Product B respectively in the named order. Comparative Example 3C accounts for still another test of setting permanent wave into the hair using the Comparison Product C.

The healthy hairs or highly damaged hairs were permed to have a permanent wave by using the heating two-bath system hair-perming liquids designated as the Invention Products A-B and the Comparison Products A-C. These products were the same testing material as used in the examples of said hair-straightening perm.

At first, the hairs to be tested were shampooed with a commercial shampooing agent in the same way as done conventionally. Thereafter the hairs received a treatment using a commercial treatment agent conventionally used after shampoos. In the test, the hairs were applied with the Invention Product A, Invention Product B, Comparison Product A, Comparison Product B or Comparison Product C which were the hair-perming liquids used in Examples of hair-straightening perm. The highly damaged hairs received a treatment using a treatment agent to be used prior to the application of the hair-perming liquids, while the healthy hairs and the like found to be hardly permed with a wave were applied with said perming liquids on their surface and back several times, in order to penetrate the liquids sufficiently into within the hairs and to soften them.

After the hair-perming liquids were applied to the hairs as the first liquid, the hairs were subjected to winding (for example, winding the hairs around a rod to curl) in the same way as done conventionally, in order to curl them as designed. Thereafter, the hairs were heated with a far infrared ray hair heater or hair steamer at a temperature of about 45°C for 1-30 minutes. In this way, the disulfide bond was broken within the hairs and the hairs got the designed wave.

Then, the adherent hair-perming liquids were removed from the surface of the softened hairs by washing them with water using a hair rinse solution like the one used in the examples of hair-straightening perm. Thereafter, the second liquid like the one used in the examples of hair-straightening perm was applied to the entire hairs recurrently. The hairs were applied with the liquids 2 times and allowed to stand for 7 minutes after each application and for a total of 14 minutes. The hairs were oxidized in a state of being wound to regenerate the broken disulfide bond within the hairs, taking the rod and the like off, in other words, removing the rod and the like around which the hairs were wound for the purpose of a wave. The adherent second liquids were removed from the hairs by washing them with water and further the hairs underwent a treatment in the same way as done in the examples of hair-straightening perm, completing setting of the designed permanent wave into the hair.

As a result of permanent wave setting, either healthy hairs or highly damaged hairs were found to have the cross section in the shape of almost complete round and return to the lustrous hairs with the use of Product A or B. At the same time, the hairs got the wave when they were in a state of having the round cross section, resulting in the formation of a beautifully arranged permanent wave. Besides, the so obtained wave was found to be capable of lasting long (semi-permanently). In contrast, it was found with the Comparison Product A that the moisture content and interstitial matrix could not deeply penetrate into the cortex of hair shaft through the cuticles without containing the ceramide. The moisture content and interstitial matrix were liable to run away to the outside, incapable of forming a precisely arranged disulfide bond. It was further found that the Comparison Product A caused the uneven wave and was inferior to the ceramide-containing hair-perming liquid of the present invention in moisture retention. The wave formed with Comparison Product A

came out in about 30 days. The Comparison Product B contained the ceramide but not the interstitial matrix and was found to be poor in the water retaining function, moisture retention and the like as compared with the Invention Products A and B. The disulfide bond was not precisely broken, the hairs were permed with the uneven waves and the so obtained hairs were poor in elasticity, strength, luster and the like. With the Comparison Product C, it was found that, at the step of reducing the hairs, the moisture content and the like seeped out and therefore that the disulfide bond was not precisely broken, giving rise to the uneven waves. The moisture retaining function was found to drop, causing the broken hairs, split hairs and the like, accompanied by a dreadful problem that the hairs themselves became thinner.

Table 4 below shows the results of evaluating Examples 3A-3B and Comparative Examples 3A-3C.

Table 4:

Performance and Effects						
	Hair damage	Elas-ticity, luster strength	Water reten-tion	Shape of waves	Intri-nsic feeling of product	Life of perm waves
(1)	Example 3A	No	◎	◎	◎	◎
	Example 3B	No	◎	◎	◎	—
	Comparative Example 3A	No	○	○	×	△
	Comparative Example 3B	No	○	○	△	△
	Comparative Example 3C	Yes	×	×	△	×
(2)	Example 3A	No	◎	◎	—	◎
	Example 3B	No	◎	◎	—	◎
	Comparative Example 3A	Yes	△	○	—	△
	Comparative Example 3B	Yes	×	○	—	△
	Comparative Example 3C	Yes	×	×	—	×

Read (1) and (2) as follows:

(1) Evaluation of the finish in the hair-straightening perm.

(2) Post-treatment evaluation of hair-straightening perm

◎: Very good ○: Fairly good △: Not so good ×: Bad

Examples 4A-4B and Comparative Examples 4A-4C

(Iron Perm)

Example 4A, Example 4B, Comparative Example 4A, Comparative Example 4B and Comparative Example 4C account for the tests of iron perm respectively by using the Invention Product A, Invention Product B, Comparison Product A, Comparison Product B and Comparison Product C in the named order.

The tests of iron perm were conducted by curling the healthy hairs or highly damaged hairs to have a wave with a pair of tongs (for heating the hairs). In these tests, the heating two-bath system hair-perming liquids respectively designated as the Invention Products A-B and Comparison Products A-C were used in the same way as in said examples of hair-straightening perm.

In the same way as done conventionally, the hairs were shampooed with a commercial shampoo agent at first and then underwent a treatment with a commercial treatment agent to be used after the shampoo. Thereafter, the hairs were applied with the same hair-perming liquid as used in the examples of hair-straightening perm. By dint of the

force of hair-reducing agent, the main component of hair-perming liquid, the ceramide, moisture content and interstitial matrix were incorporated into within the hairs through the space of cuticles from the hair-perming liquid. The actions of the ceramide present in the hair-perming liquid had the hairs shaped into a complete round and softened. Softening of the hairs was expedited by heating the hairs with a far infrared hair heater or hair steamer at a temperature of about 50°C for 1-30 minutes, in order to break the disulfide bond within the hairs. The adherent first liquid was washed with water and removed from the surface of the hair. Then, the hair was rinsed and received a treatment in the same way as in the examples of hair-straightening perm, followed by curling the hair with an iron in the same way as done conventionally. That is, a ceramic far infrared ray hair heater at a set temperature of 100°C-180°C set a wave into the entire hair, curling slice by slice respectively in a width of about 1 cm to complete the designed wave.

After such curling, the same second liquid as that of the examples of hair-straightening perm was applied to the entire hair. The liquid was applied to the hair 2 times and the hair was fixed with oxidization by allowing it to stand for 5 minutes after each application and for a total of 10 minutes. Then, the adherent second liquid was washed with water and removed from the hair, and the hair received a treatment in the same way as in the examples of hair-straightening perm, completing iron perm as designed.

As a result, there was the following finding in the test wherein iron perm was conducted by using the Invention Products A and B which were the heating two-bath system hair-perming materials of the present invention. It was found that a beautifully formed wave was set into the hair, because the hair was curled in a state of being densely packed with the interstitial matrix and moisture content and having the cross section in the shape of complete round. Such a beautiful wave was also partly explained by the fact that the disulfide bond was regenerated under these same circumstances. . The wave was also found to be insusceptible to damages or roughness as compared with the conventional curling technique. The so obtained wave did not come out semi-permanently.

In contrast, the Comparison Product A was found to have a problem that, in the test wherein it was used as the first liquid, the wave was formed as desired in the post-operation period. With the elapse of time, however, the moisture content and interstitial matrix ran away from the cuticles giving rise to the damaged or rough hairs, the wave disappeared within about 1-2 weeks and moisture retention dropped in the hair. The Comparison Product B contained the ceramide but not the interstitial matrix and had the water retaining function inferior to and moisture retention lower than those of the Invention Products A and B. Thus, the Comparison Product B was found to have a problem that the hair was susceptible to the damages as compared with the Invention Products A and B, failing to form the beautifully arranged wave.

The Comparison Product C was a strong chemical liquid, having a problem that heating with the iron deprived the hair of a great deal of moisture and moisture retention was lost throughout the entire hair. Thus, It was found that the cuticles were damaged and thus that the hair were rough and stiff and dry and got damages.

Table 5 below shows the results of evaluating Examples 4A-4B and Comparative Examples 4A-4C.

Table 5:

		Performance and Effects					
		Hair damage	Elasticity, luster strength	Moisture retention	Shape of waves	Intrinsic feeling of product	Life of iron perm
(1)	Example 4A	No	◎	◎	◎	◎	-
	Example 4B	No	◎	◎	◎	◎	-
	Comparative Example 4A	No	○	○	△	○	-
	Comparative Example 4B	No	○	○	△	○	-
	Comparative Example 4C	Yes	×	×	△	×	-
(2)	Example 4A	No	◎	◎	-	◎	◎
	Example 4B	No	◎	◎	-	◎	◎
	Comparative Example 4A	Yes	△	△	-	△	×
	Comparative Example 4B	Yes	△	△	-	△	△
	Comparative Example 4C	Yes	×	×	-	×	△

Read (i) and (2) as follows:

(1) Evaluation of the finish in the hair straightening perm.

(2) Post-treatment evaluation of hair straightening perm

◎: Very good ○: Fairly good △: Not so good ×: Bad

Effects of the Invention:

As evident from the descriptions provided above, the heating two-bath system hair-perming liquid of the present invention can advantageously be used in not only hair-straightening perm but also setting a permanent wave into the hair or iron perm according to the heating two-bath system hair-perming technique. These liquids are characterized in that they are high in safety, good in creating the smooth hair by making it elastic, strong and lustrous and efficiently increase the service life of the perming effects.

Using the heating two-bath system hair-perming liquids of the present invention as the first liquid, the perming technique can effectively perm even the strongly kinky hairs to straighten out (mending the curly hairs). Furthermore, since the hairs are permmed in the shape of complete round, the mode of hairs resulting from perm can effectively be fixed and will be good in the service life. Still another advantage is that perming with the use of these liquids is feasible without the risk of causing the damages in the hairs.

Brief Description of the Drawings:

Fig. 1 is the sketches of the microscopic pictures illustrating the cross section of a hair harvested in the examples. The (a) and (b) respectively account for the outside shape of the cross section of a straight hair from the persons A and B.

Fig 2 is the sketches of the microscopic pictures illustrating the cross section of a hair harvested in the examples. The (a), (b) and (c) respectively account for the pre- and post-operational outside shape of the cross section of curly hairs from the persons C, D and E.

Fig. 1

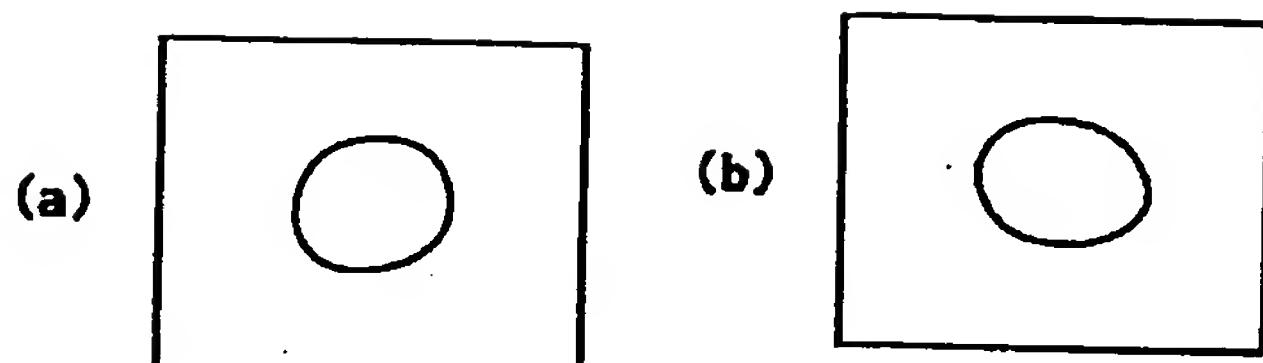


Fig 2

